

United States Patent [19]

Bernstein

[11] **Patent Number:** **4,704,355**[45] **Date of Patent:** **Nov. 3, 1987**

[54] **ASSAY UTILIZING ATP ENCAPSULATED
WITHIN LIPOSOME PARTICLES**

[75] Inventor: David Bernstein, Sykesville, Md.

[73] Assignee: New Horizons Diagnostics
Corporation, Columbia, Md.

[21] Appl. No.: 716,702

[22] Filed: Mar. 27, 1985

[51] Int. Cl.⁴ G01N 33/53; G01N 33/532

[52] U.S. Cl. 435/6; 435/8;
436/501; 436/520; 436/827; 436/829

[58] Field of Search 436/520, 521, 827, 829,
436/501; 435/6, 8

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,575,811	4/1971	Chappelle	435/8
3,850,578	11/1974	McConnell	
4,014,745	3/1977	Fletcher	435/8
4,078,052	3/1978	Papahadjopoulos	
4,193,983	3/1980	Ullman et al.	
4,235,792	11/1980	Hsia et al.	
4,235,871	11/1980	Papahadjopoulos et al.	
4,241,046	12/1980	Papahadjopoulos et al.	
4,246,340	1/1981	Lundin et al.	
4,286,057	8/1981	Wulff et al.	
4,298,685	11/1981	Parikh	435/7
4,314,026	2/1982	Descamps et al.	
4,342,826	8/1982	Cole	
4,358,535	11/1982	Falkow	435/35 X
4,385,113	5/1983	Chappelle et al.	
4,394,149	7/1983	Szoka, Jr. et al.	
4,394,448	7/1983	Szoka, Jr. et al.	
4,421,848	12/1983	Whitlock	435/8
4,429,008	1/1984	Martin et al.	
4,480,041	10/1984	Myles et al.	
4,483,929	11/1984	Szoka	435/8 X
4,508,829	4/1985	Sulitzeanu	436/827 X
4,581,222	4/1986	Baldeschwieler	436/827 X
4,623,618	11/1986	Rokugawa	435/6

OTHER PUBLICATIONS

Chemical Abstracts, I, 100:47988b, (1984).

Chemical Abstracts, II, 91:189242y, (1979).

Chemical Abstracts, III, 94:170547s, (1981).

Endoh, H. et al., (1981), J. Immunol. Meth. 44:79-85.

DeLuca, M. et al., (1974), Biochem. 13:921-925.

Dunnick, J. K. et al., (1975), J. Nucl. Med., 16:483-487.

Huang, A. et al., (1980), J. Biol. Chem., 17:8015-8018.

Heath, T. D. et al., (1980), Biochim Biophys Acta, 599:42-62.

Papahadjopoulos, D. et al., (1967), Biochim Biophys Acta, 135:639-652.

Chowhan, Z. T. et al., (1972), Biochim Biophys Acta, 266:320-342.

Shen, D. F. et al., (1982), Biochim Biophys Acta, 689:31-37.

Heath, T. D. et al., (1981), Biochim Biophys Acta, 640:66-81.

Deamer, D. et al., (1976), Biochim Biophys Acta, 443:629-634.

Batzri, S. et al., (1973), Biochim Biophys Acta, 298:1015-1019.

Bangham, A. D., (1965), J. Mol. Biol., 13:238-252.

Huang, L. et al., (1979), Biochem, 18:1702-1707.

Uemura, K. et al., (1972), Biochem, 2:4085-4094.

Hastings et al., (1968), Ann Rev Biochem, 37:603.

Heath et al., (1980), Science, 210:539-541.

Primary Examiner—Sidney Marantz

Attorney, Agent, or Firm—Roylance, Abrams, Berdo & Goodman

[57] **ABSTRACT**

An assay utilizing receptor or antibody sensitized liposome particles which have ATP encapsulated therein. The ATP is released by lysing the liposomes, and detected by means of luciferin-luciferase reagent and a luminometer. The assay provides a very sensitive process for detecting the presence of analytes such as antigens and DNA probes.

19 Claims, No Drawings